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54 Vending machine

The invention relates to a goods vending machine with improved purchase price information devices. In particular, the invention concerns an improved price display system for a vending machine with a plurality of sales paths. The prices of the articles on the individual shelves are inventively electronically displayed individually immediately adjacent to the shelves. The prices and the displayed price information can be modified rapidly and simply at a central location within the vending machine. In addition, the operating mode and the modifiable compartment size for the individual shelves can be displayed and modified. Using a timer, there is the option of modifying all prices at a pre-specified point in time. Inventively, only a small number of leads are required for controlling a large number of display units.

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Patent Claims

1. Goods vending machine for selling different articles at different prices from a plurality of dispensing units that are arranged at positions situated spaced apart from one another in a cabinet behind a door that permits viewing of said dispensing units with said articles for sale but that does not permit access thereto and with purchase price information devices for said various articles,
characterized in that
said purchase price information devices encompass a plurality of individually actuatable purchase price display units (28a through 28k) that are mounted adjacent to said positions (A through K) and are visible to potential purchasers when said door (14) is closed, and in that provided at a central location within said cabinet (12) are setting and actuating devices (48, 50, 56, 58) that are only accessible when said door (14) is open and with which prices for said individual dispensing units (18a through 18k) can be adjusted and said display units (28a through 28k) for displaying these prices are actuatable.

2. Vending machine in accordance with claim 1, characterized in that said setting and actuating devices (48, 50, 56, 54) include additional selecting devices (42b through 42k) that can be used to select one of said display units (28a through 28k).
3. Vending machine in accordance with claim 1 or 2, characterized in that said setting and actuating devices (48, 50, 56, 58) have a first switch (56) for incrementally increasing the purchase price and a second switch (58) for incrementally decreasing the purchase price.
4. Vending machine in accordance with any of claims 1 through 3, characterized in that said setting and actuating devices (48, 50, 56, 58) are embodied such that the purchase price data can be fed to all display units (28a through 28k) simultaneously and in that selecting devices (42a through 42k) are provided that can be used to release only one of said display units (28a through 28k) for accepting the data.
5. Vending machine in accordance with any of claims 1 through 4, characterized in that memory devices (78) are provided that can be used to store two sets of prices for said display units (28a through 28k) and in that control devices (92, 94)

are provided that can be used to select the set of prices to be displayed.

6. Vending machine in accordance with claim 5, characterized in that said control devices are embodied such that normally the first set of prices is displayed and have switch devices (94) that can be closed for initiating the display of said second set of prices and can be actuated by a timer (92).
7. Vending machine in accordance with claim 6, characterized in that said setting and actuating devices (48, 50, 56, 58) are embodied such that said second set of prices can be changed when said switching devices (94) are closed.
8. Vending machine in accordance with claim 1 with a plurality of access panels allocated to said individual display units, characterized in that said setting and adjusting devices (48, 50, 56, 58) include selection devices (42a through 42k) that can be used to select said display unit (28a through 28k) allocated to said pertinent dispensing unit (18a through 18k) depending on an opening movement of one of said panels (24a through 24k).
9. Vending machine in accordance with any of claims 1 through 8, characterized in that said display units

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(28a through 28k) are embodied as electronically controllable display units.

10. Vending machine in accordance with claim 4, characterized in that said devices for simultaneously feeding said purchase price data to all display units (28a through 28k) include a data line (88) and in that said devices for releasing only one of said display units (28a through 28k) for accepting the data include two clock lines (86 and 90).

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Vending Machine

The invention relates to a goods vending machine for selling different articles at different prices from a plurality of dispensing units that are arranged at positions situated spaced apart from one another in a cabinet behind a door that permits viewing of the dispensing units with the articles for sale but that does not permit access thereto and with purchase price information devices for the various articles.

Known are vending machines that are suitable for dispensing various articles or individual items from corresponding dispensing units, whereby each article is dispensed from a dispensing unit after a corresponding quantity of money has been input into the machine. One example of such a vending machine is described in US PS 4,317,604. In the known vending machine, the dispensing units are formed by different shelves of a drum that is rotatable about a vertical axis in order to position a compartment of the particular shelf behind

one of the normally closed doors or panels on the front of the machine. During the course of a dispensing procedure, once the quantity of money necessary for the particular article has been input into the vending machine, a panel unlocking magnet on the shelf in question is triggered when the customer begins to open the panel, whereupon the latter is released and can now be opened completely, allowing access to the compartment behind the panel. Devices are provided in the known vending machine that permit the number of compartments on one shelf to be doubled and simultaneously decrease by one half the size of each compartment. US PS 4,391,388 describes an improved control system for the vending machine in accordance with US PS 4,317,604. With regard to the individual shelves, this control system permits the setting of two operating modes, "FIFO" mode and "shopper" mode. In the "shopper" mode, the articles on the particular shelf can be removed in any sequence according to the desire of the customer. In the "FIFO" mode, the articles are only supplied/dispensed in a pre-specified sequence.

When employing vending machines of the type described in the foregoing, some purchase price information devices are always provided that notify a customer about the price of the goods or articles on a particular shelf. These purchase price information

devices can for instance include conventional price tags such as are used in grocery stores to display the purchase price of the individual articles. It is obvious that exchanging such price tags or exchanging individual numerical elements thereof for modifying the price information is relatively time-consuming and tedious.

Furthermore, it has been demonstrated that in the case of highly perishable articles, such as e.g. prepared dishes, sandwiches, and the like, it is desirable to reduce the purchase price toward the end of the workday when the vending machine is set up in a factory or the like. Vending machines of types known in the past are not suitable as they are for such a change in price. In the first place, a technician is generally required to modify the prices, and, secondly, it is somewhat difficult to change the price tags or the like to different shelves. The amount of time and effort required to change the price therefore frequently exceeds the profit that the vendor would hope to attain by ensuring that no goods are left over and spoil.

Starting with the prior art, the object of the invention is to improve a goods vending machine of the type cited in the foregoing in that the purchase price information can be modified rapidly and easily.

This object is attained in a generic vending machine in accordance with the invention in that the purchase price information devices encompass a plurality of individually actuatable purchase price display units that are mounted adjacent to the cited positions and are visible to potential purchasers when the door is closed, and in that provided at a central location within the cabinet are setting and actuating devices that are only accessible when the door is open and with which prices for the individual dispensing units can be adjusted and the display units for displaying these prices are actuatable.

It is a substantial advantage of the inventive vending machine/the inventive purchase price display system that the price information to be displayed by the individual display units can be modified at a central location, in particular by simply keying in the price information.

In one advantageous embodiment of the invention, the individual display units are embodied as electronic display units for which the data to be displayed can be modified at a central location.

One particular advantage of the inventive vending machine is furthermore that there should be practically no more possibility that there will be a deviation between the displayed price and the price at which an article is

actually intended to be sold, since the data with which the display units are controlled can also be used simultaneously for controlling the coin counter.

There is an additional advantage of the invention for the operating personnel in that with one embodiment of the invention it is possible to provide a (central) display unit at which, not only is it possible to display the price at which an article is intended to be sold, but the operating mode and the compartment size for the shelf or dispensing unit in question can also be displayed.

In one embodiment of the invention it is furthermore advantageously possible to change the price and consequently also the displayed price for the individual articles automatically as a function of the time of day such that for instance for a first period of time every day a first set of prices applies and then a second set of in particular lower prices.

In one embodiment of the invention it is furthermore advantageously possible to control a relatively large number of display units via a relatively small number of connecting cables.

Additional details and advantages of the invention are explained in greater detail in the following using drawings and/or are the subject of subordinate claims. Specifically:

Fig. 1 is a front elevation of a preferred embodiment of a vending machine in accordance with the invention with an inventive display system;

Fig. 2 is a partial interior view of the vending machine in accordance with Fig. 1, specifically a control field thereof;

Fig. 3 is a front elevation of one of the display units for a vending machine in accordance with Fig. 1 that has a plurality of shelves;

Fig. 4A and Fig. 4B are each schematic depictions of a part of the electrical circuit of the display system for a vending machine in accordance with Fig. 1; and,

Fig. 5 is a schematic diagram of the temporal course of various signals in the circuit in accordance with Figs. 4A and 4B.

In detail, Fig. 1 illustrates a vending machine 10 that is equipped with an inventive price display system and that has a cabinet-shaped housing or a cabinet 12 that is provided with a door 14 that normally closes the front side of the cabinet 12. A drum 16, that is rotatably borne inside the cabinet 12 about a vertical axis, has a plurality of shelves 18a through 18k, of which each has a plurality of compartments 20 from which individual items of goods for sale can be dispensed. The vending machine 10 can be constructed largely in a manner known per se, for instance in accordance with the teachings in the aforesaid US PS 4,317,604. Provided in the door 14 is a window 22 that extends across the height of all of the shelves 18a through 18h so that the individual items of goods for sale can be viewed by a potential purchaser. Arranged adjacent to the window 22 are a plurality of panels 24a through 24k in the form of small sliders, and these are arranged vertically one above the other. A vertical field 26, which is arranged between the window 22 and the series of panels 24 arranged vertically one above the other, has one display unit 28a through 28k per shelf, each display unit 28a through 28k being provided at the height of the associated shelf. If the customer has deposited an adequate amount of money, but if the selected compartment 20 is not flush with the associated panel 24, a lamp 29 illuminates when the customer attempts to open the particular

panel 24a through 24k in order to direct his attention to written instructions that read, "Rotate the drum to the correct position" or the like. If the customer attempts to open one of the panels 24a through 24k without having first deposited an adequate amount of money, the price display blinks and reminds the customer of the fact that he has not deposited enough money yet.

Furthermore provided in the door 14 on the front side of the cabinet 12 is a slot 30 through which paper money can be inserted into an evaluation unit. Furthermore provided in this door is a coin slot 32 for depositing coins. Also provided in the door 14 is a button 34 that, when actuated, causes the drum 16 to rotate so that all of the articles pass by behind the window 22 and can be viewed by a potential customer. A keypad 26 [sic] has a number of keys A through K that correspond to the number of potential selections in the vending machine 10. As is explained in greater detail in the following, it can be prespecified for each shelf 18a through 18k of the machine that the articles be dispensed in the prespecified "first in - first out" (FIFO) sequence or in any desired sequence. If the FIFO mode is preselected for a particular shelf,

then when the key in the keypad 36 that is allocated to that particular shelf is actuated, the drum 16 rotates by one compartment width. If the article on the selected shelf can be dispensed in any sequence, then actuating the key in the keypad 36 that is allocated to this shelf leads to the drum 16 rotating for as long as the key is depressed. In this case, the key can be released at any time at which the desired article on the selected shelf is situated behind the associated access panel.

In the exemplary embodiment, each of the panels 24a through 24k is provided with a handle 38 that permits the associated panel to be displaced – in Fig. 1 it slides to the right. After a limited movement of the panel, a cam 40 actuates one of a number of panel magnet unlocking switches 42a through 42k. If a quantity of money that equals at least the purchase price of the selected article has been deposited into the vending machine, then when the switch 42 has been actuated, the corresponding panel unlocking magnet is excited, releasing the appropriate panel so that it can now be completely opened. US PS 4,317,604, already addressed in the foregoing, describes the details of the panel unlocking. As can be seen immediately, if only half-width compartments are provided on the selected shelf,

"completely opening" the panel can only mean that the panel can be displaced only half the distance that it can be displaced when full-width compartments are provided on that shelf.

As Fig. 2 illustrates, a control field 44 is provided in the interior of the cabinet 12 behind the part of the door 14 that carries the keypad 36. The control field 44 includes a main display unit 46 as well as two DIP switches 48 and 50. The switch 48 can either be set so that then the mode can be set for a certain shelf or so that the price can be set for an article on this shelf that is to be sold. The switch 50 can either be set so that the drum 16 advances incrementally depending on the actuation of a "RUN" button or so that the drum 16 rotates continuously for the period this button is actuated. The control field 44 furthermore includes a door locking switch 54 as well as two buttons 56 and 58. The button 56 can be actuated in order to increase the price in 5-Pfennig increments when the switch 48 is in the price changing position. Using the button 58, the price can be lowered in 5-Pfennig increments when the switch 48 is in its price changing position. In contrast, when the switch 48 is in the shelf adjusting position, the

button 56 can be actuated to switch between "warehouse mode (articles dispensed in any sequence)" and "FIFO mode", while actuating the button 58 switches between the mode with large and small compartments.

As can be seen from Figs. 4A and 4B, the switches 42a through 42k each join a connection of an associated panel unlocking magnet 60a through 60k (more precisely, the one connection of the exciter winding of such an electromagnet) to an associated transistor 64a through 64k. The corresponding connection of the cabinet door unlocking magnet 62 is joined via a corresponding switch to another transistor 66. The control connections of the transistors 64a through 64k and 66 are joined to multiplexers 70 that are connected on the input side to outputs of a decoder 72 that controls a microprocessor 74, for instance of the type 8050 from Intel Corporation. A voltage supply circuit 76, which is switched between the other connection of the unlocking magnet 60a through 60k and connections P 12, T 1, and T 0 of the microprocessor 74, is actuated in order to feed a signal voltage or an excitation voltage to the magnets or to their exciter windings.

A memory 74 that is suitable for storing two sets of prices completes the part of the

control circuit that is important for the invention.

Due to the manner in which the part of the control circuit described in the foregoing works, when the door is closed 14 and after depositing an adequate quantity of money, the user can make a selection in that he slides the panel 24a through 24k in front of the compartment with the selected article (slides panel to the right). In this case the supply circuit 76 is actuated such that it supplies a voltage to the magnet 60a through 60k that corresponds to the selection made, this voltage being adequate to excite the magnet such that the panel is unlocked so that it can be opened completely in order to allow access to the purchased article. However, if the cabinet door 14 is open, which for instance is the case when a price is being adjusted, and if then the movement of one of the panels to its open position is initiated, then closing the particular switch, e.g. the switch 42a causes a pulse to be applied to the exciter winding of the particular magnet – the magnet 60a -- via one of the transistors – the transistor 64a – that is adequate to indicate by means of a suitable circuit that the particular shelf and its associated display has been selected for a price change. Of course, the voltage pulse is not sufficient to actuate the particular magnet 60a. This is explained in greater detail in the following.

The control field 44 includes two light-emitting diodes that illuminate when the button 56 or 58 is pressed. The microprocessor 74 delivers a first clock pulse sequence on a CLK 1 line 86 in order to clock in the data that are to be displayed. The data that are to be displayed are transmitted via a second line 88. A third line 90 transmits a second clock signal CLK 2, which is used to select the main display unit 46 and the display units 28a through 28k provided for the individual shelves in order to determine which of these units is activated.

In accordance with the drawing in Fig. 3, the display units 46 and 28a through 28k each include three 7-segment displays that can be selectively controlled to display the numerals 0 through 9 and the letters F and S, the letters being used to display the "FIFO" mode or the "Shopper" mode. In addition, the letters L and S can be selected in order to symbolize large or small (indicates compartment size). In Fig. 3, reference symbols a1 through g1, a2 through g2, and a3 through g3 are allocated to the individual locations of the display units. Each of the display units furthermore includes a decimal point or comma indicator.

For setting the prices, the cabinet door 14 (the door in front of the coin mechanism) must be open. In addition, the switch 48 must be open for a price

modification. If one of the buttons 56 or 58 is the actuated, the associated light-emitting diode 82 or 84 then illuminates to indicate that a price is being set. In one preferred embodiment, the program is selected such that when changing to the "price setting" mode, the release for price setting and for displaying selection option a occurs immediately. Thus, if the operator wants to modify the price for selection option a or for shelf a, he merely depresses button 56 to increase the price for this class of goods in 5-Pfennig increments. When depressing the button 58, the price for the goods on shelf a decreases in 5-Pfennig increments. The modified price, or the price to be modified, is then displayed not only by the display unit 28a for this shelf, but also by the main display unit.

If the operator wants to modify the price for goods on another shelf, he slides the corresponding panel to the right to actuate the particular switch 42b through 42k. The microprocessor 74 then identifies the particular shelf and delivers pulses on the line 90, which (pulses) actuate the display units 28a through 28k one after the other until the display for the selected shelf has been reached. Once the selected display unit is reached, the price displayed there is increased or decreased incrementally by actuating the buttons 56 and 58. If the operator depresses one of the buttons continuously,

the price is increased or decreased incrementally very rapidly. The speed is as high as the computer or microprocessor will allow. The price modification terminates as soon as the button is then released. If the operator reduces the price, this process is automatically interrupted at 0. On the other hand, if the price is increased, the price automatically progresses until it reaches an amount of DM 9.95 and then jumps to a price of 0. The arrangement is designed such that when the machine is turned on for the first time, when nothing is yet stored in the memory 78, all of the prices are set to the value DM 9.95. Since most of the prices are clearly lower, it is significantly faster to increase the price incrementally, whereby first the price jumps to 0 and from there starts over. This is the reason that the option to jump back to the value of 0 is provided for the price increase.

As was stated in the foregoing, for selecting the display unit that must be set, the operator moves the panel 24 allocated to this display unit to actuate the associated switch 42. Each of the display units 28 is consequently controlled as follows. Each of the display units 28 includes (internally) a flip-flop. First a "1" is set on the data line, and a clock pulse appears on the line 90 to release the main display unit. The level "1" then terminates on the data

line 88, and there are a number of clock pulses on the line 90 that correspond to the desired display unit. Thus, if the operator wants to set the price for shelf 18d, there are five clock pulses on the line 90. Although the data are simultaneously transmitted to all of the display units in this manner, they are only clocked in in the released display unit. Thus the opportunity is inventively created to control a large number of display units via only three lines. It is clear without anything further that normally twelve lines would be required for controlling all twelve display units. The savings in space and line costs attained in this manner are particularly important for vending machines in which, as in the exemplary embodiment, the display units are provided vertically above one another in a narrow field 26 between the transparent window 22 and the transparent panels 24. The pulse trains that occur on the lines 86, 88, and 90 are illustrated in Fig. 5.

The inventive system is preferably provided with reset devices that reduce all of the prices at a prespecified time, for instance, relatively late in the day if the machine is set up in a factory or the like. In this manner the price for the left-over goods is reduced. For this purpose, a switch 94 is closed by means of a suitable timer 92 of any known

construction at the prespecified time. The second set of prices applies for as long as the switch is closed, and these prices are displayed. The individual prices of the second set can be modified using the same method as was explained in the foregoing with respect to the first set, with the difference that the switch 94 is closed for inputting the prices of the second set.

In the inventive system, it is possible with nothing further to switch between the "FIFO" mode and the "Shopper" mode. In addition, the compartments sizes can be changed. This is accomplished in that the switch 48 is moved to the "ON" position. When this has occurred, the status of every selection option or shelf is displayed on the price display. Specifically, in the "Shopper" mode, the letter "S" is displayed at the highest point of the display unit, and in the "FIFO" mode the letter "F" is displayed. Furthermore, when the small compartment is selected, an "S" is displayed in the last position of the particular display unit, and an "L" is displayed when the large compartment is selected. For changing the status on a shelf, the particular panel 24 is first moved somewhat to the right. Then the button 56 is actuated to switch between the "FIFO" and "Shopper" modes. The button 58 can be actuated to switch between large and small compartments.

After any settings have been accomplished, normal "Sell" mode is selected by simultaneously actuating the two buttons 56, 58 for a period of two seconds or – automatically – when the door 14 is closed.

From the foregoing description it is clear that the object upon which the invention is based is attained and numerous additional advantages are achieved. Overall, in accordance with the invention an improved price display system is created for a goods vending machine for a number of different goods. In accordance with the invention, electronically controlled price display units are provided that are arranged adjacent to the vending subunit to which they are allocated, whereby the displayed prices can be modified by means of a common control unit. By actuating this control unit, the displayed prices can be rapidly and easily modified at a central location, whereby the current mode on a shelf and the compartment size can also be displayed using the display units. In addition, the inventive display system, in connection with a timer, provides the option of automatically switching between different prices, whereby setting and modifying prices can be performed rapidly and easily, even for a large number of price displays.

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While a preferred exemplary embodiment was described in the foregoing, it is obvious that, starting with this exemplary embodiment, numerous options for modifications and/or additions are available to one skilled in the art without departing from the original idea of the invention.

Finally, it should be noted that in Fig. 4 of the drawings, the various connections of the individually integrated circuits are labeled with the conventional symbols familiar to one skilled in the art. It should furthermore be noted that the time data in Fig. 5 should be considered the minimum times for the duration of the individual signals.